WATER REUSE AD HOC COMMITTEE MEETING

January 7, 2016

Agenda

- 1. Welcome and Introductions
- 2. Review Existing Conditions
 - A. Existing Water System
 - **B.** Water Management Policies
 - C. Water Sources Existing
- 3. Selection of Chair and Vice Chair
- 4. Questions/Discussion of Committee

Water Distribution System Basics

- Components of Water System
- Kerrville's Existing System
- Basics of Water System Hydraulics
- Water System Best Practices



Water System Components

- Raw Water Supply
 - Surface Water
 - Groundwater
- Aquifer Storage and Recovery
- Non-Potable Direct Reuse
- Water Treatment Plants
 - Treats surface water to drinking water standards
 - Conventional Plant (5.184MGD)
 - Zenon Plant (1MGD)
- Pump Stations
 - Conveys water by adding pressure
- Pipelines
 - Transports water to customers







Water System Components

- Elevated Storage Tanks
 - Provide Pressure, fire flow and emergency storage
- Valves
 - Control flow of water or pressure
 - Isolate lines for maintenance
- Fire Hydrants
 - Provide fire protection
 - Ability to Flush Water

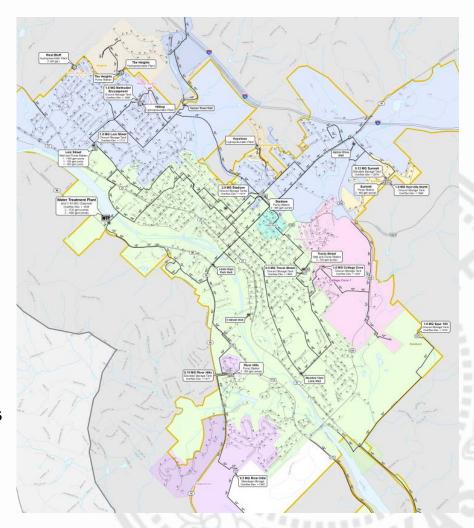






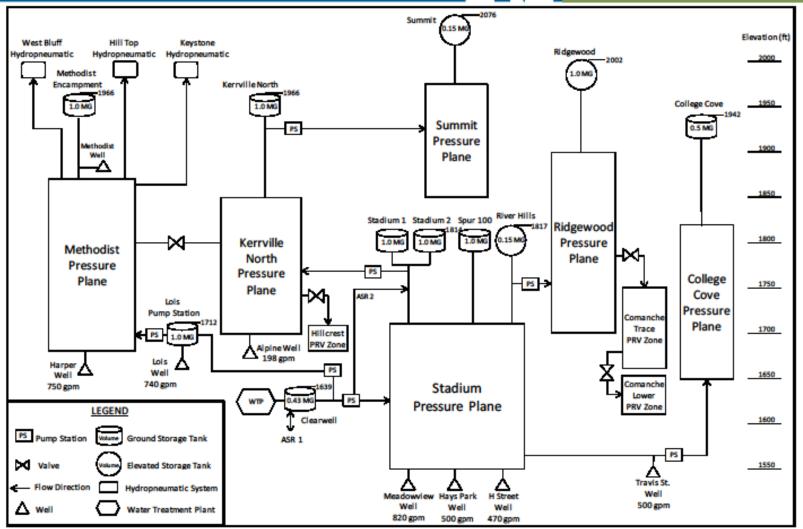
Kerrville's Existing System

- Water Supply Sources
 - 2 Water Treatment Plants
 - 8 Groundwater Wells
 - 2 ASR
- 13 pressure planes
 - 3 Elevated Storage Tanks
 - 10 Ground Storage Tanks
 - 6 GST act as Elevated Storage
- Water Distribution Lines
 - 238 miles
 - 2" to 16" pipes
- 10 Pump Stations
 - High Service
 - Booster Pumps
- Non-Potable Direct Reuse
 - 1 WWTP
 - Pump station at WWTP/ 3 pumps
 - 7 miles of pipe
 - 7 current users
 - 3 onsite customer owned storage ponds

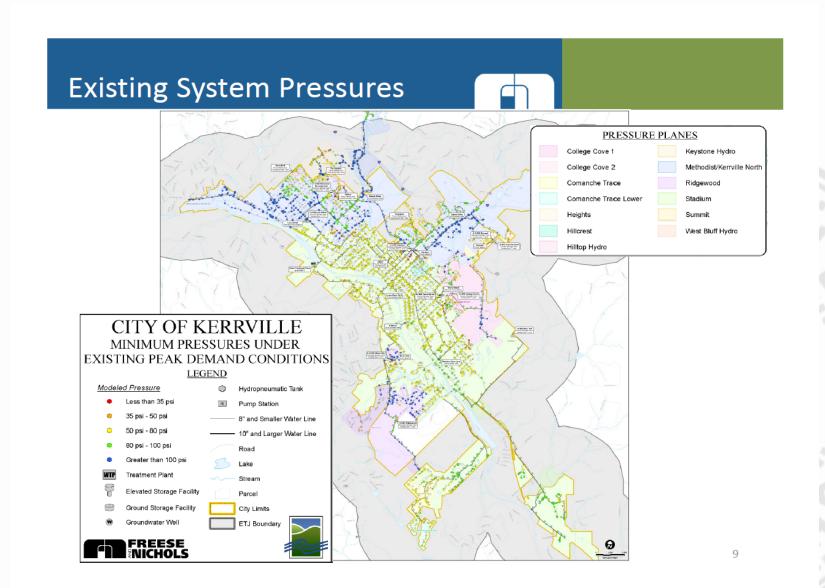


Kerrville Existing System





Water System Hydraulics



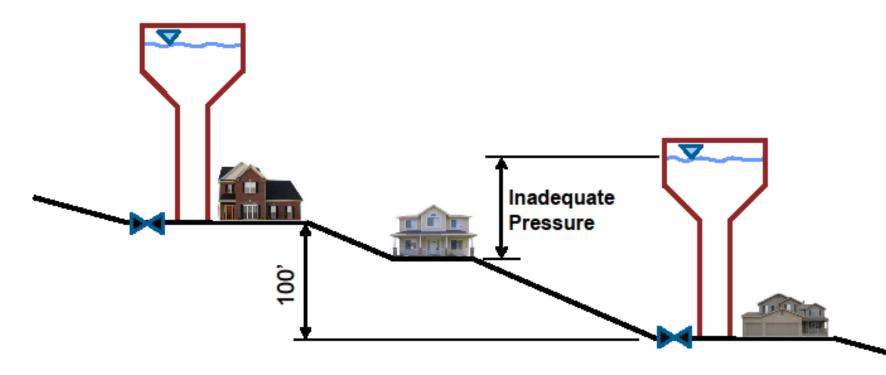
Water System Hydraulics

- Topography (elevation change across City)
- Customer demands
 - Vary seasonally and hourly
- Pressures
 - 35 psi regulatory minimum
 - High pressures can be problematic
- Fire Flows
 - Minimum residual pressure of 20 psi
 - Required flow varies depending on land use type
 - Typical range desired fire flow = 1,500 to 3,500 gpm

Why Multiple Pressure Planes?



New Pressure Planes are Required when Elevation Varies Across the Service Area (typically ~100 ft of elevation difference requires a new pressure plane)



Water System Best Practices

- Maintain appropriate system pressures by establishing higher pressure planes and PRV zones when necessary
- Utilize elevated storage to reduce peak hour pumping, prevent pressure lose during power outage and for emergency protection
- Maintain adequate storage for fire flow and emergencies
- Multiple supply points (provides redundancy)
 - Water treatment plant
 - Groundwater wells
- Adequate ground storage to endure supply outages

Water Conservation

Water Management Plan

Drought Contingency Plan

Water Conservation Plan

 TCEQ mandates a Drought Contingency Plan and a Water Conservation Plan for all cities using surface water to ensure there is minimal waste and conservation occurs.

Drought Contingency Plan purpose is to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation and fire protection, and to protect and preserve public health, welfare and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions.

Water Conservation Plan purpose is to develop a strategy or combination of strategies for reducing the consumption of water, reducing the loss or waste of water, and improving or maintaining the efficiency in the use of water, and increasing recycling and reuse of water.

 City Council adopted the first Water Management Plan ordinance in 2004 and updated it in June 2011. The above plans were adopted in 2014.

Conservation means those practices, techniques, and technologies that:

- (1) Reduce the consumption of water;
- (2) Reduce the loss or waste of water;
- (3) Improve the efficiency in the use of water; or
- (4) Increase the recycling and reuse of water so that a supply of water is conserved and made available for future or alternative uses.

Safe operating capacity means the maximum amount of potable water which, expressed in millions of gallons per day (mgd), the city is safely capable of delivering to the city's water distribution system at any given time from:

- (1) The total available from the city's water treatment plant(s);
- (2) The total available from the city's aquifer storage and recovery well(s);
- (3) The total available from the city's groundwater wells; and/or
- (4) Total available from other potable water sources that may be added in the future or, due to regulatory changes that increase or decrease water availability, from existing facilities/sources.

CITY OF KERRVILLE WATER MANAGEMENT

HOW & WHEN YOU CAN WATER							
Year Round Water Conservation (Mandatory)	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5		
(manadiory)	7 Day Avg.	7 Day Avg.	7 Day Avg.	7 Day Avg.	7 Day Avg.		
Automatic & Hose End Sprinkiers, and soaker hoses are permitted:	Automatic & Hose End Sprinklers, and soaker hoses are permitted:	Automatic & Hose End Sprinklers, and soaker hoses are permitted:	Automatic & Hose End Sprinklers, and soaker hoses are permitted:	Automatic & Hose End Sprinklers, and soaker hoses are:	Automatic & Hose End Sprinklers, and soaker hoses are:		
6:00 PM to 10:00 AM	6:00 AM to 10:00 AM and 8:00 PM to 12:00 AM	6:00 AM to 9:00 AM and 8:00 PM to 10:00 PM	6:00 AM to 9:00 AM	PROHIBITED AT ALL TIMES	PROHIBITED AT ALL TIMES		
	TUES & SAT ODD ADDRESSES	TUES & SAT ODD ADDRESSES	TUES & SAT ODD ADDRESSES	PROHIBITED ON ALL DAYS	PROHIBITED ON ALL DAYS		
EVERYDAY	WED & SUN EVEN ADDRESSES	WED & SUN EVEN ADDRESSES	WED & SUN EVEN ADDRESSES	PROHIBITED ON ALL DAYS	PROHIBITED ON ALL DAYS		
Hand-Held Hose w/ Nozzle, Drip Irrigation, or Bucket are permitted:	Hand-Held Hose w/ Nozzle, Drip Irrigation, or Bucket are permitted:	Hand-Held Hose w/ Nozzle, Drip irrigation, or Bucket are permitted: 7:00 PM to 9:00 AM	Hand-Held Hose w/ Nozzie, Drip irrigation, or Bucket are permitted: 6:00AM to 9:00AM and 7:00 PM to 11:00 PM	Hand-Held Hose w/ Nozzle, Drip Irrigation, or Bucket are permitted: 6:00AM to 9:00AM and 7:00 PM to 11:00 PM	Hand-Held Hose W Nozzle, Drip Irrigation, or Bucket are: PROHIBITED AT ALL TIMES		
EVERYDAY	EVERYDAY	EVERYDAY	EVERYDAY	EVERYDAY	PROHIBITED ON ALL DAYS		
FOR A COMPLETE UNDERSTANDING OF THE WATER MANAGEMENT PLAN, PLEASE REFER TO KERRVILLE'S CODE OF ORDINANCES, CHAPTER 110, ARTICLE III, @ www.kerrvilletx.gov							

Council Amended Ordinance: June 14, 2011 Ordinance Revisions Effective: June 28, 2011

- Stage 1—Moderate water conservation conditions. "Stage 1—Moderate water conservation conditions" shall
 be deemed to exist when the city manager finds that the seven day average water demand exceeds 65
 percent of the safe operating capacity or where a water supply emergency is declared and the city
 manager determines that this stage is appropriate to address the emergency.
- Stage 2—Critical water conservation conditions. "Stage 2—Critical water conservation conditions" shall be
 deemed to exist when the city manager finds that the seven day average water demand exceeds 75
 percent of the safe operating capacity or where a water supply emergency is declared and the city
 manager determines that this stage is appropriate to address the emergency.
- Stage 3—Crucial water conservation conditions. "Stage 3—Crucial water conservation conditions" shall be
 deemed to exist when the city manager finds that the seven day average water demand exceeds 85
 percent of the safe operating capacity or where a water supply emergency is declared and the city
 manager determines that this stage is appropriate to address the emergency.
- Stage 4—Severe water conservation conditions. "Stage 4-Severe water conservation conditions" shall be deemed to exist when the city manager finds that the seven day average water demand exceeds 95 percent of the safe operating capacity or where a water supply emergency is declared and the city manager determines that this stage is appropriate to address the emergency.
- Stage 5—Water emergency conditions. "Stage 5—Water emergency conditions" shall be deemed to exist
 when the city Manager finds that the seven day average water demand exceeds 100 percent of the safe
 operating capacity or where a water supply emergency is declared and the city manager determines that
 this stage is appropriate to address the emergency.

Water Sources

Current Water Supply Strategies

- Surface Water from Guadalupe River Run of the River rights (1st use) Impoundment rights (2nd use)
- Groundwater Wells (3rd use)
- Aquifer Storage and Recovery ASR (4th use)
- Non-Potable Reuse

Average total demand is between 3 to 5 MGD

Surface Water

Surface Water from Guadalupe River

- Impoundment capacity is 840 ac-ft
- Run of the River rights available when not curtailed by the TCEQ Watermaster = 6051 ac-ft

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Permit # 5394 = 2,169 ac-ft (1992) Run of the River
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Permit # 3505 = 3,603 ac-ft (1977) Impoundment/ Run of the River

Permit # 1996 = 225 ac-ft (1914) Run of the River

Permit # 18-2026A = 54 ac-ft (1961) Run of the River

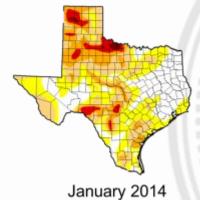
Surface Water

Limitations of Surface Water

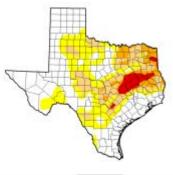
- Not available during floods
- Limited during drought
- Highly regulated by the State of Texas
- Typically junior rights and curtailed first
- 1 ½ year of water (average total demand)



River Flow = 31cfs



River Flow = 34 cfs



September 2015

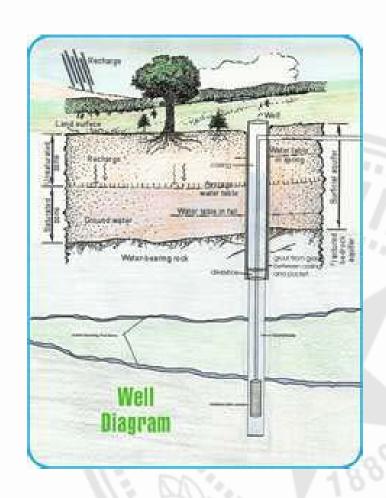
River Flow = 15cfs

Groundwater Wells

- City currently operates 8 groundwater wells (depth of 450-800 ft)
- Lower Trinity Aquifer
- Annual groundwater permitted = 4,160 ac-ft per year

Limitations of Groundwater

- Limited amount available
- Slow to recharge
- Highly regulated by State and Local Government
- 1 year of water (average total demand)



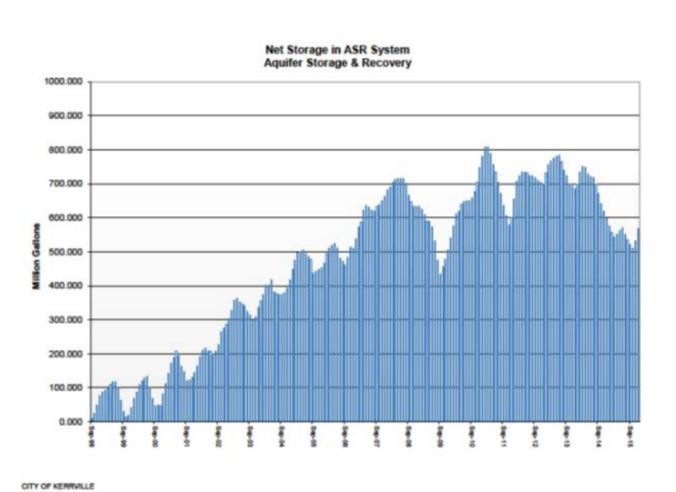
Aquifer Storage & Recovery (ASR)

- City operates 2 ASR wells
- As of December 2015 590 million gallons stored (1,811 ac-ft)
- 6 months of water (average total demand)
- City of Kerrville was the first city in Texas to develop an ASR well system (1998)

Limitations of ASR

- Cost of well construction
- Inability to alternate between ASR water and ground water
- Can only store when excess surface water is available
- Size of well and aquifer determines storage ability

Aquifer Storage & Recovery (ASR)



Water Sources

- Sample Notice of Intent for Monthly Declared Permitted Municipal Diversion
- City is required to submit this monthly to the Watermaster
- Typical water strategy is to use 80% surface water and 20% groundwater



City of Kerrville

Water Production Division 701 Main St. Kerrville, Texas 78028-5301 830.257.4668 (O) 830.257.4686 (F)

Fax

To:	Angela Sander	From:	Grant Terry
Company:	TCEQ Region -13	Date:	12/29/2015
Phone	(210) 403-4041	Pages:	1, including cover page
Fax	(210) 545-4329	Month:	January-2016
Re:	Monthly Declared Permitted Municipal Diversion		

Municipal use diversion declarations for the referenced month are indicated below

PERMIT NO.	JAN - 20
3505-400	346 Ac-I
5394-400	174 Ac-l
1996-400	000 Ac-f
1996-401	000 Ac-I
18-2026	000 Ac-F
5208-401	000 Ac-I

Non-Potable Reuse

- The City provides 100% of its summertime (May-August) WWTP effluent (approximately 2.5 MGD) as reuse water to current customers
- 7 current user including Commanche Trace Golf Course, Scott Schreiner Golf Course, Tivy HS Athletics, Soccer Complex, Animal Shelter, Water Haulers, WWTP
- TCEQ regulates quality of water discharged

Limitations of Non-Potable Reuse

- Reuse water is only available as treated and available for discharge from the plant. Our system is a non-pressurized on demand system. (no storage)
- Typically seasonal
- Demand driven
- Approximately 350 MG of Non-Potable Reuse is sent downstream during the winter each year